

CLAIMS:

1. A confocal microscope or endoscope, having:
 - a source of coherent light for illumination of a
5 sample;
 - a light focusser for receiving and focussing said
coherent light to an illumination volume that in use
intersects said sample;
 - a beam-splitter for receiving return light
10 returned from said sample in response to said illumination
and for diverging from said return light a fluorescent
component of said return light; and
 - an imaging optical fibre bundle comprising a
plurality of individual fibres, having an entry end
15 located to receive said diverged fluorescent component of
said return light so that said diverged fluorescent
component is transmitted to an exit end of said fibre
bundle;
 - wherein said fibre bundle preserves, between said
20 entry end and said exit end of said fibre bundle, the
relative spatial coordinates of the cores of said
individual fibres.
2. A confocal microscope or endoscope as claimed in claim
25 1, further comprising a single mode fibre for transmitting
said coherent light from said source and having an exit
end mounted in a fixed spatial relationship to said entry
end of said fibre bundle.
- 30 3. A confocal microscope or endoscope as claimed in
either claim 1 or 2, wherein said relative spatial
coordinates are transformed between said ends such that an
image can still be formed.
- 35 4. A confocal microscope or endoscope as claimed in claim
3, wherein said coordinates are reversed so that a mirror
image is formed.

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5. A confocal microscope or endoscope as claimed in any one of the preceding claims, wherein said microscope or endoscope is embodied as an ophthalmoscope.

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6. A confocal microscope or endoscope as claimed in any one of the preceding claims, wherein said beam-splitter comprises a simple or compound prism.

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7. A confocal microscope or endoscope as claimed in any one of the preceding claims, wherein said beam-splitter comprises a transmission or reflection diffraction grating.

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8. A confocal microscope or endoscope as claimed in any one of the preceding claims, wherein said microscope or endoscope includes a further beam-splitter, optically reversed relative to said beam-splitter and located optically after said fibre bundle, to improve focal plane isolation.

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9. A confocal microscope or endoscope as claimed in any one of the preceding claims, wherein said microscope or endoscope includes a spatial filter optically after said fibre bundle.

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10. A confocal microscope or endoscope as claimed in claim 9, wherein said spatial filter comprises a variable aperture.

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11. A confocal microscope or endoscope as claimed in any one of the preceding claims, wherein said microscope or endoscope includes a scanner for providing scanning of said illumination volume relative to said sample.

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12. A confocal microscope or endoscope as claimed in claim 11, wherein said scanner comprises a mirror or a

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tuning fork.

13. A confocal microscope or endoscope as claimed in
claim 11, wherein said scanner comprises a pivotably
5 mounted member provided with collimating optics for
collimating said coherent light.

14. A confocal microscope or endoscope as claimed in
claim 13, wherein said collimating optics comprise a
10 simple or compound lens.

15. A confocal microscope or endoscope as claimed in
claim 13, wherein said pivotably mounted member is mounted
by means of, and is pivotable about, an axle.

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16. A confocal microscope or endoscope as claimed in
claim 13, wherein said pivotably mounted member is mounted
by means of a pair of flexible supports that differ so
that said pivotably mounted member can be pivotted by
20 being oscillated.

17. A confocal microscope or endoscope as claimed in
claim 16, wherein said flexible supports differ in length.

25 18. A confocal microscope or endoscope as claimed in any
one of the preceding claims, including one or more shallow
angle prisms located in an image plane to separate out
different spectral bands, and a plurality of fibre
bundles, each for receiving a respective spectral band,
30 for producing multiple colour images.

19. A confocal microscope or endoscope as claimed in
claim 18, including a plurality of separate photo-
detectors, each for detecting a respective spectral band
35 transmitted by a respective one of said fibre bundles.